FISHERY RESEARCH

Job Performance Report
Project F-73-R-14

HATCHERY TROUT EVALUATIONS

Subproject V, Study I
Put-and-Take Stocking Relations
Rock Creek Size Experiment, Salmon River Census

By

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JOB PERFORMANCE REPORT

State of: Idaho

Name: Hatchery Trout Evaluations

Project: F-73-R-14

Title: Put-and-Take Stocking Relations - Rock Creek Size Experiment, Salmon River Census

Subproject: V

Study: I

Period Covered: April 1, __ 1991 to March 31, 1992

ABSTRACT

I used historical census data from Idaho streams to evaluate effects of stocking rates and angler effort on hatchery rainbow trout Oncorhynchus mykiss harvest and return rates. Based on preliminary analysis, stocking 280 fish/km at effort levels of 224 h/km would optimize return (fish harvested/fish stocked) and harvest (fish/hour) rates near 0.4. This equates to a recommended stocking rate of about 1.25 fish/angler hour.

Count-interview census was conducted on the upper 24 km of Rock Creek and 50 km of the upper Salmon River in 1991 to examine return rates of hatchery rainbow trout.

Anglers fished Rock Creek 6,182 hours from May 25 through September 13. They caught 4,923 rainbow, brook Salvelinus fontinalis, and brown trout Salmo trutta at 0.81 fish/h and harvested 3,720 at 0.61 fish/h. Hatchery rainbow trout made up 88% of the harvest, return-to-creel was 50% of the number stocked, and harvest rate was 0.54 fish/h for the put-and-take fishery. Anglers harvested approximately twice (1.7-2.3 times) as many large (>275 mm) as small (<275 mm) stocked rainbow trout. At 1991 production costs, large fish in the creel were about three times as expensive by number, but 1.7 times less costly by weight compared to small rainbow trout.

Census estimates placed return of tagged fish at half the rate of unmarked hatchery trout. Compliance with return of tags ranged from 27-82% depending on method of estimation.

Anglers fished 31,849 hours to catch 44,565 game fish at 1.48 fish/h in the upper Salmon River. Hatchery rainbow trout made up 79% of the harvest. Anglers harvested 38% of the hatchery rainbow trout stocked at rates averaging 0.50 fish/h.

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TEXT

INTRODUCTION

The Idaho Department of Fish and Game (IDFG) initiated a hatchery trout evaluation program in 1991 to increase benefit:cost ratios associated with the use of hatchery fish. A principle product of this research was to be guidelines for the use of hatchery trout. Ongoing work involved synopsis of existing information to (1) provide guidelines based on existing knowledge, and (2) define areas where experimental work is needed. This report reviews stocking relationships and data from two field projects designed to explore techniques and results for put-and-take evaluations in streams.

Pawson (1982) indicated optimum stocking rates should be based on catch and effort. Frequent stocking was necessary to maintain acceptable levels of angler success. Catch rates, however, do not increase proportionally with stocking rate (Rohrer 1991), and rate of return may decline with stocking level (Rohrer 1991, Thurow 1990). Information on factors affecting the harvest of hatchery trout is needed to manage put-and-take fishing on an efficient basis.

The goal for put-and-take fisheries in Idaho is 40% return of fish stocked (IDFG 1991). Thurow (1990) found returns increased with angler effort. Rohrer (1991) suggested large fish may increase return rates, angler effort, and satisfaction with put-and-take fishing. Mullan (1956) and Partridge (1986) found larger hatchery-reared fish returned at higher rates. However, Cuplin (1958) found 180 mm hatchery fish returned better than 250-280 mm trout.

Since size of fish has the potential to affect angler success, participation, and return, I designed a tag recovery-census program to evaluate harvest of large versus small rainbow trout stocked in upper Rock Creek near Twin Falls, Idaho. Census on Rock Creek and the upper Salmon River near Stanley, Idaho also provided data points for stocking relations.

OBJECTIVES

1. Define relationships between catchable trout stocking rate and rate of return-to-the-creel, catch rate and yield, and return-to-the-creel and angling effort using existing data.

2. Review relevant literature on catchable programs in streams; develop stocking guidelines for number, timing, and location in relation to expected or desired angler use; display expected levels of return-to-the-creel.

3. Develop and evaluate stocking methods to increase return rates of catchable trout.

4. Define relationships between fingerling trout stocking rate and rate of return-to-the-creel, catch rate and yield, and return-to-the-creel and angling effort.

5. Define tradeoffs in size of fish stocked. Estimate cost of fish in the creel in relation to size at release.

TEXT

METHODS

Put-and-take Stocking Relations

Relationships between stocking rates and fishing quality were developed from IDFG creel census data. I plotted harvest and return rates obtained from creel census reports against fish stocking rates (number/km). I also used estimates of angler effort (h/km) as independent variables. I combined stocking and effort data for another independent variable. This was the ratio of number of fish stocked throughout the season divided by total angler hours.

Put-and-take Stocking Guidelines

Guidelines for the use of rainbow trout in put-and-take fisheries were not developed this year. I did assemble and catalogue relevant literature and contact other states working with put-and-take fisheries.

Tools for Increasing Returns

Count-interview census was conducted on the upper 24 km of Rock Creek and 50 km of the upper Salmon River in 1991 to examine return rates of hatchery rainbow trout in put-and-take fisheries.

Rock Creek

I divided the upper portion of Rock Creek into four sections based on stream size, gradient, stocking density, and anticipated angler use (Figure 1). Count-interview census was stratified by time of day, day type, time interval, and stream section. Census was set up initially on eight two-week intervals (Table 1). I subsequently combined these to four four-week intervals to provide more precise harvest estimates. Four angler count periods were randomized for hourly start times within days and day types to sample two week-days and two weekend-days plus holidays during each two week interval. Anglers were interviewed while fishing Rock Creek or in associated campgrounds to determine hours fished and fish caught. As many harvested fish were measured and checked for tags as possible. Analysis was conducted using the Idaho Creel Census System (McArthur 1991).

Fish were stocked four times during the census in the upper portion of Rock Creek. Twelve hundred rainbow trout from each of two distinct size groups were marked with numbered monel jaw tags (Table 2, Figure 2). A sample of fish from each size group was measured prior to release. Small fish (160-270 mm) were 9 month old Hayspur rainbow trout reared at Hagerman hatchery, except for the May release which was Erwin stock. Large fish (275-475 mm) were two-year old surplus Hayspur rainbow trout broodstock reared at Hayspur hatchery and held at Hagerman up to two months prior to stocking in Rock Creek. Fish were tagged and measured in the morning, just prior to transportation to Rock Creek.

Tags and streamside posters instructed anglers to return tags to the Idaho Department of Fish and Game. Posters requested location, date, gave the Region 4 Office address and offered baseball caps as rewards (Appendix 1).

I used chi-square and Z-tests (Zar 1984) to analyze differences in number of fish harvested by release group (large versus small and tagged vs unmarked).

TEXT

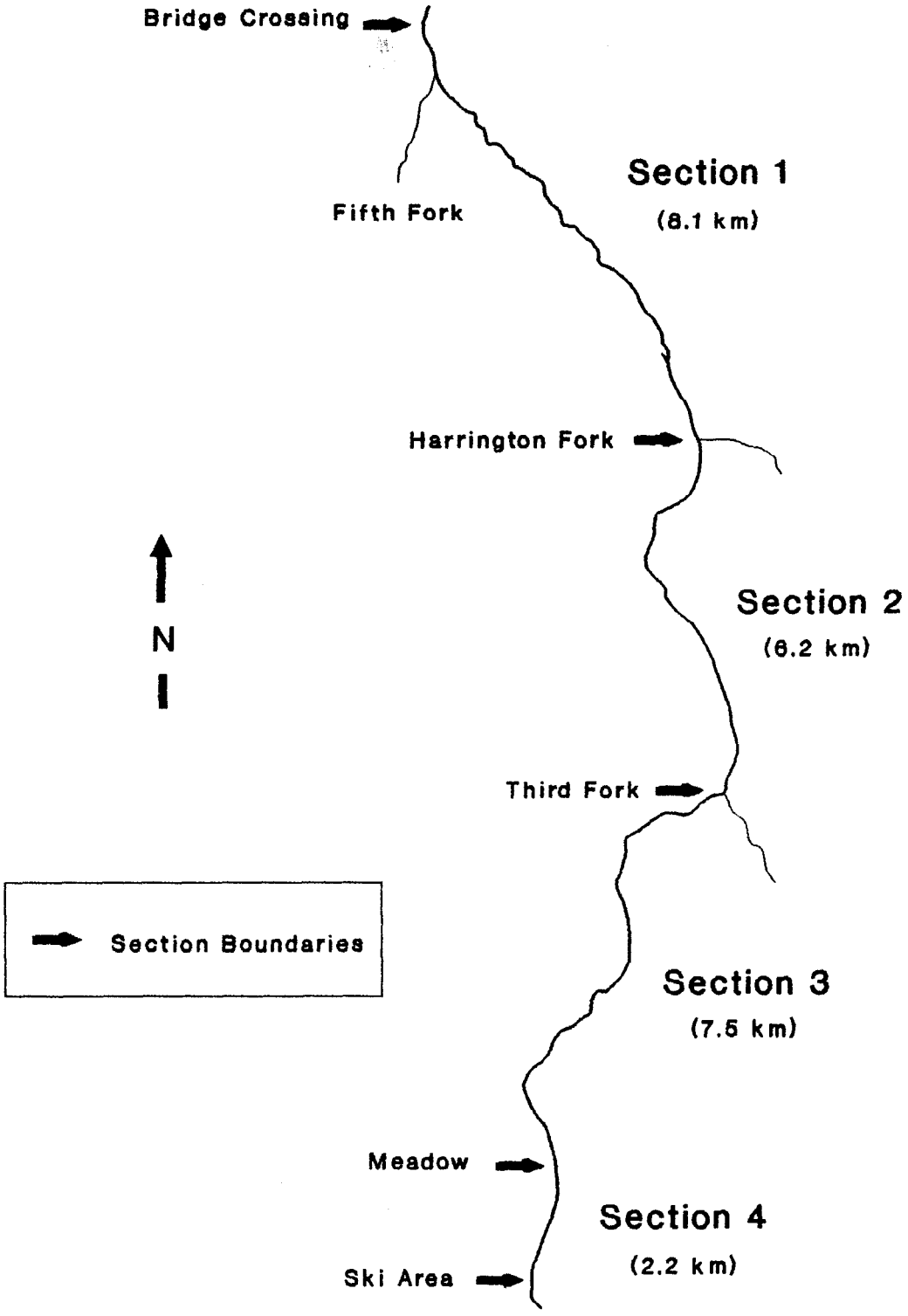

Figure 1. Map of upper Rock Creek showing sections for 1991 creel census.

Table 1. Census intervals for upper Salmon River and Rock Creek in 1991.

Two-week interval	Dates	Four-week interval
1	May 25 – Jun 7	1
2	Jun 8 – Jun 21	
3	Jun 22 – Jul 5	2
4	Jul 6 – Jul 19	
5	Jul 20 – Aug 20	3
6	Aug 3 – Aug 16	
7	Aug 17 – Aug 30	4
8	Aug 31 – Sep 13	

Table 2. Rainbow trout stocked in upper Rock Creek near Twin Falls, Idaho during 1991 census.

Size Group	Date	Number Stocked	TL (mm)	Tag Numbers	Number Tagged
Small	May 22	1,492	182-272	N6501-N6800	300
	Jun 26	600	177-233	N6801-N7000 N7901-N8000	300
	Jul 24	841	185-230	N8001-N8300	300
	Aug 21	672	160-260	H2801-H3100	300
Total Small		3,605	160-272		1,200
Large	May 22	1500	300-401	B1101-B1400	300
	Jun 26	600	275-475	B1401-B1600 H2001-H2100	300
	Jul 24	359	278-415	P0301-P0600	300
	Aug 21	528	295-410	P0001-P0300	300
Total Large		2,987	275-475		1,200
Grand Total		6,592	160-475		2,400

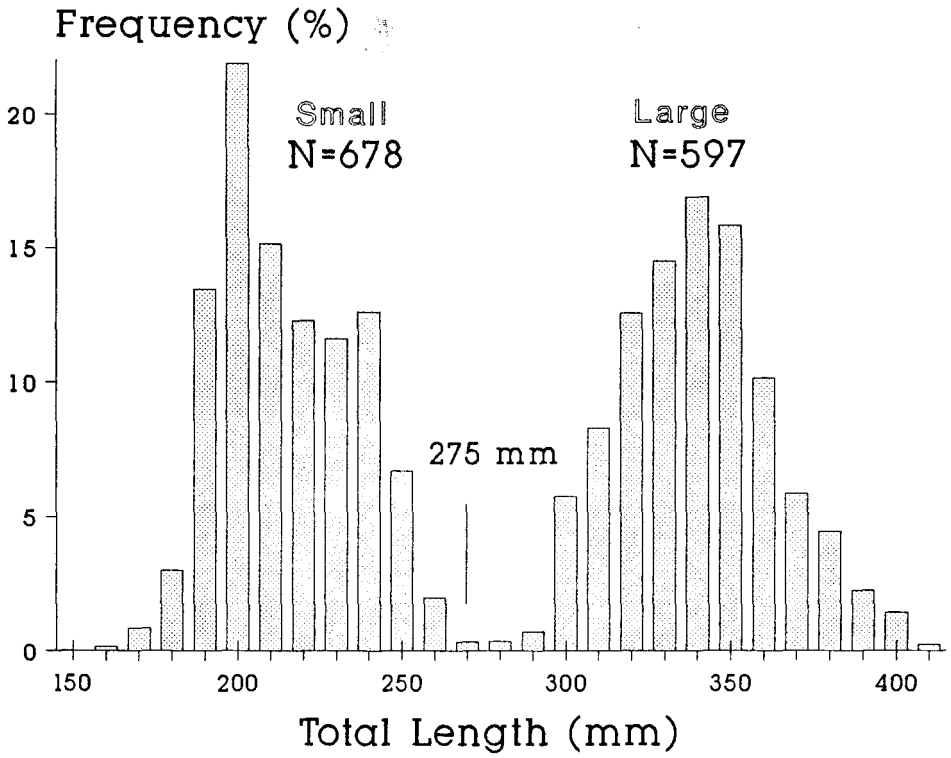

Figure 2. Length distribution of small and large rainbow trout stocked in upper Rock Creek in 1991(weighted for total number in each release).

Salmon River

Census intervals and techniques were as for Rock Creek (Table 1). Sawtooth hatchery personnel conducted counts and interviews. Two-week intervals were retained for estimates, because consistently high angler effort provided good levels of precision. Rainbow trout for the upper Salmon River were reared at Hayspur Hatchery and held in raceways at Sawtooth Hatchery prior to distribution. Stocking frequency varied up to once per week for heavily fished, accessible river sections (Appendix 2). Approximately 50 km of the upper Salmon River from the Sportsmens Access 0.8 km below Gold Creek downstream to Torrey's Boat launch below the Yankee Fork were censused (Figure 3). Stocking rates varied from 400-1200/km and 90-400/hectare (Table 3).

Stream widths used to calculate stocking densities for the upper Salmon River came from an IDFG database.

Fingerling Stocking Relations

Guidelines for the use of rainbow trout in put-and-grow fisheries were not developed this year.

Size Tradeoffs

Work was limited to coordination with IDFG regions and hatcheries to start long-term evaluations of the performance of put-and-take compared to put-and-grow fish in lakes and reservoirs.

RESULTS

Stocking Relations

Harvest rates of hatchery rainbow trout have increased with density of fish stocked per kilometer in Idaho streams. Rate of increase however appears to decline as stocking rates exceed 200-300/km (Figure 4). By contrast, return of hatchery fish to the creel has declined as number stocked per kilometer increased (Figure 4).

Harvest rates appear to have declined, and return-to-creel has increased as angler effort increased (Figure 5).

Increases in number of hatchery rainbow trout stocked per hour of estimated angling effort have produced increasing harvest rates and declining return rates (Figure 6).

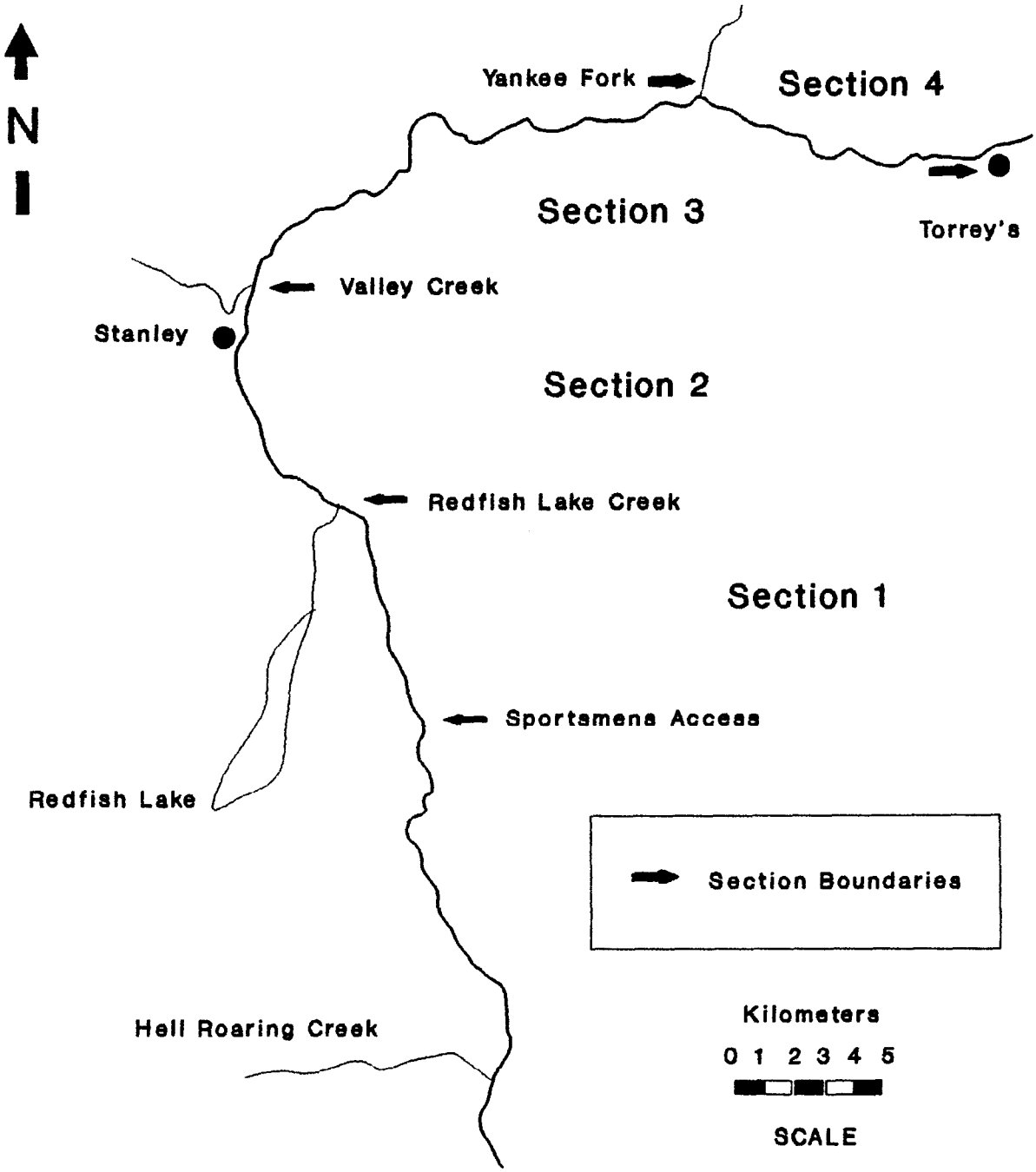

Figure 3. Map of the upper Salmon River showing sections for 1991 creel census.

Table 3. Rainbow trout stocking information for the upper Salmon River near Stanley, Idaho in 1991.

Census Section	Location	Length (km)	Width (m)	Area (Ha)	Number Stocked	Number per km	Number per Ha
1	Access to RfLCr[a]	8.0	24.7	19.8	8,020	1,003	406
2	RfLCr to Valley Cr	8.4	35.4	29.7	10,120	1,205	340
3	Valley Cr to Yankee F	19.8	45.7	90.5	23,320	1,178	258
4	Yankee F to Torrey's	12.7	45.7	58.0	5,000	394	86
Total	Access to Torrey's	48.9	40.5	198.0	46,460	950	235

[a] Redfish Lake Creek

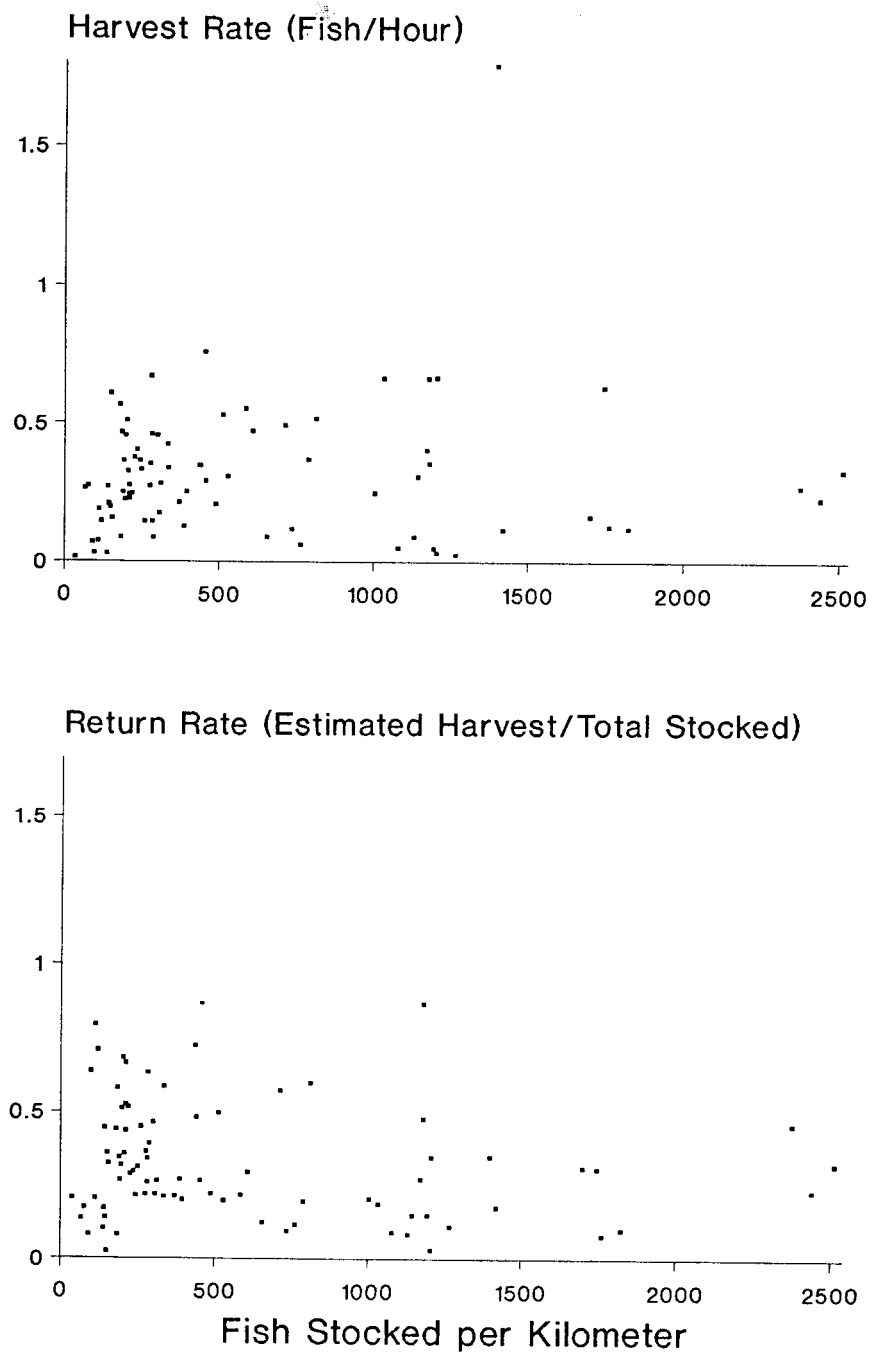

Figure 4. Relationships based on stocking density (fish/km) of put-and-take rainbow trout to harvest rate (fish/h) and return rate for Idaho streams.

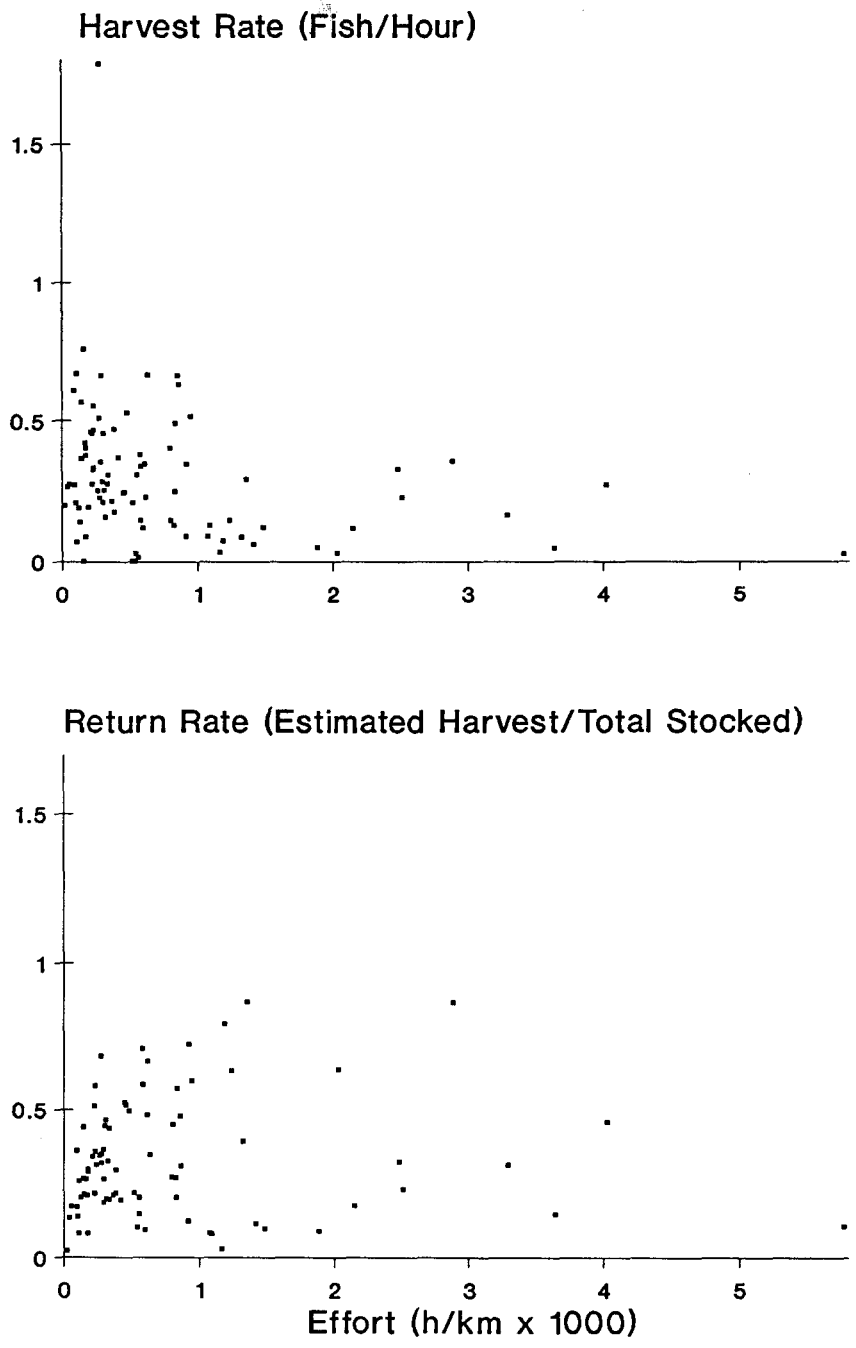

Figure 5. Relationships of angler effort (h/km) to harvest rate (fish/h) and return rate of Idaho streams stocked with put-and-take rainbow trout.

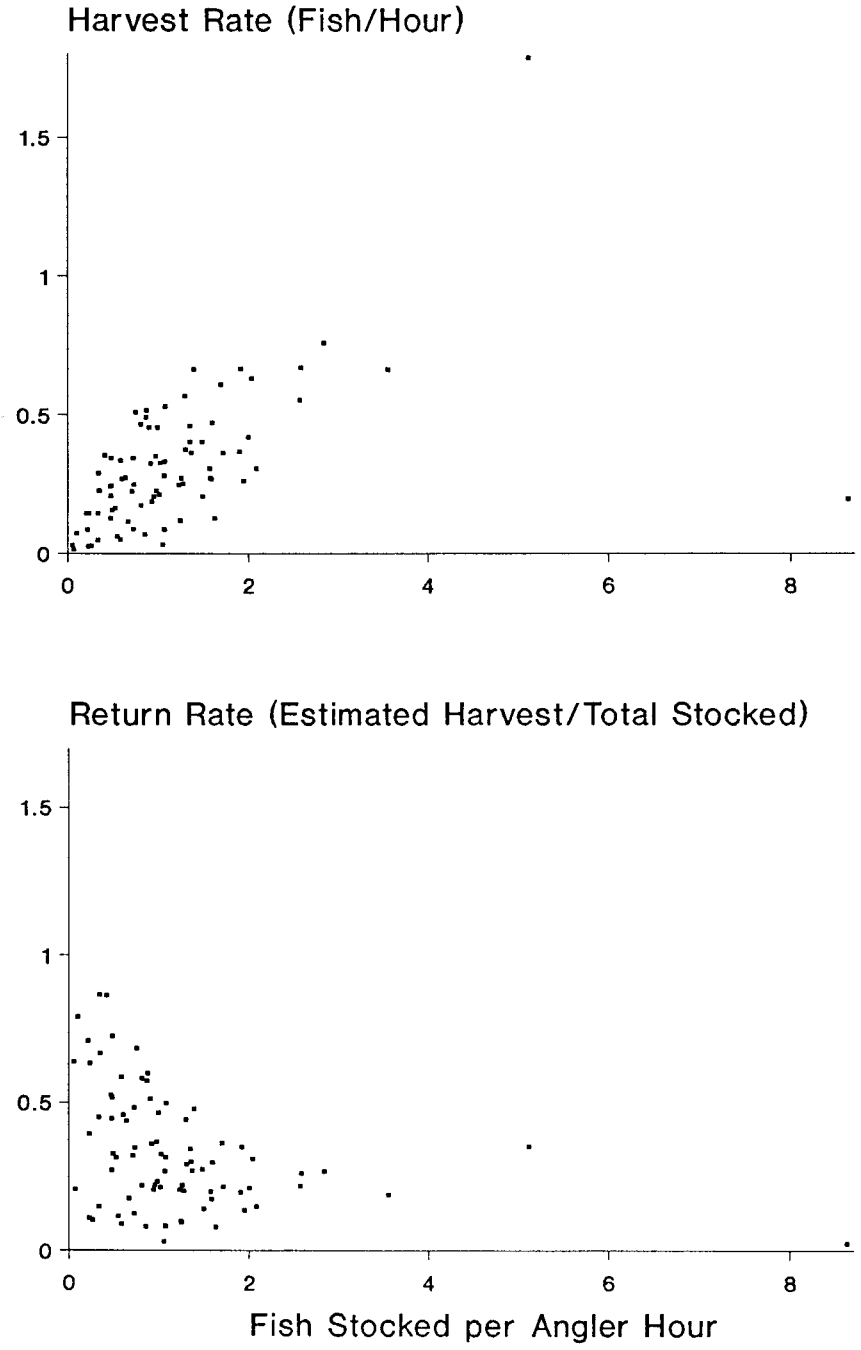

Figure 6. Relationships based on the number of put-and-take rainbow trout stocked per angler hour on Idaho streams.

Tools for Increasing Returns

Rock Creek

Anglers fished 6,182 hours to catch 4,923 trout at 0.81 fish/h in upper Rock Creek in 1991 (Appendices 3 and 4). An estimated 88% of 3,720 trout harvested were stocked rainbow trout. Other species were wild rainbow, brook, and brown trout. Harvest rate for hatchery rainbow trout was 0.54 fish/h (Table 4). Estimated return-to-creel from the census was 50% of the 6,592 fish stocked in 1991 (Table 5).

Census estimates indicated large stocked rainbow trout returned 1.8-2.3 times as often as small fish (Table 5, Figure 7). Ratios of large to small fish ranged from 1.5:1 to 2.0:1 for voluntary tag returns and interview data. All differences were significant (P = 0.05).

Tagged fish were creeled less often than unmarked hatchery rainbow trout (Table 5). Harvest of small tagged fish was consistently less than that of small unmarked rainbow trout, whereas large fish showed some variation in relative harvest or harvest levels (Figure 7). Anglers caught 80% of the large unmarked fish stocked and 44% of the large tagged rainbow trout. Small unmarked rainbow trout returned at 45% compared to 19% for tagged fish (Table 5). All differences were significant (P = 0.05).

Better than 21% of the 2,400 tags placed on fish stocked in upper Rock Creek were returned by anglers (Table 5). Several returns could not be verified, because tags were removed from envelopes by U.S. Postal Service mailing machines. By comparison, harvest estimates indicated overall recovery rate was 32% for tagged fish. Anglers returned 515 tags compared to a harvest estimate of 756 tagged fish in the census (Table 5). Compliance estimated by comparing harvest estimates to angler returns was thus 68% (62% for large fish, 82% for small fish). Anglers returned 22 of 78 tags noted during interviews for an estimated compliance of 28% (29% for large fish, 27% for small fish).

Tag returns indicated anglers harvested greater numbers of large hatchery fish shortly after stocking. Small rainbow trout usually sustained harvest levels similar to large fish after the first two weeks. Some fish from most of the releases persisted in Rock Creek into early fall (Figures 8-11).

Estimates of angling effort and harvest of large hatchery fish declined through the season. Despite this, numbers of tags returned by fishermen remained fairly similar over time (Figure 12).

Salmon River

Anglers fished an estimated 31,849 hours to catch 44,565 game fish at 1.48 fish/h (Appendices 5 and 6). Hatchery rainbow trout made up 79% of the harvest. Harvest rates for hatchery rainbow trout averaged 0.50 fish/h (Table 6). Estimated return-to-creel was 38% of the 46,460 fish stocked. Remainder of the harvest consisted of steelhead smolts, wild rainbow trout, bull trout Salvelinus confluentus, cutthroat trout Oncorhynchus clarki, chinook salmon Oncorhynchus tshawytscha (one fish, 46 cm examined), and mountain whitefish Prosopium williamsoni (Appendices 5 and 6).

Best angler success (0.76 hatchery trout/h) was associated with the highest stocking densities (1.9) in Section 2, from Redfish Lake Creek to Valley Creek (Table 6). Highest return of 47% occurred

Table 4. Estimated hatchery rainbow trout harvest and angler effort for upper Rock Creek in 1991.

	Census Section				
	1	2	3	4	Total
Harvest	1,411	1,307	413	140	3,271
Effort (hours)	3,143	2,181	542	316	6,182
Hours per km	388	352	72	144	258
Fish per hour	0.48	0.60	0.63	0.73	0.54

Table 5. Estimated return-to-creel of large and small rainbow trout stocked in upper Rock Creek in 1991 (numbers in parentheses are percentages).

	Large			Small			
	Tagged	Unmarked	Total	Tagged	Unmarked	Total	Total
Stocked	1,200	1,787	2,987	1,200	2,405	3,605	6,592
Harvest	527	1,423	1,950	229	1,092	1,321	3,271
Return	(44)	(80)	(65)	(19)	(45)	(37)	(50)
Creel	53	158	211	29	108	137	348
Reward	328			187			515
Return	(27)			(16)			(21)

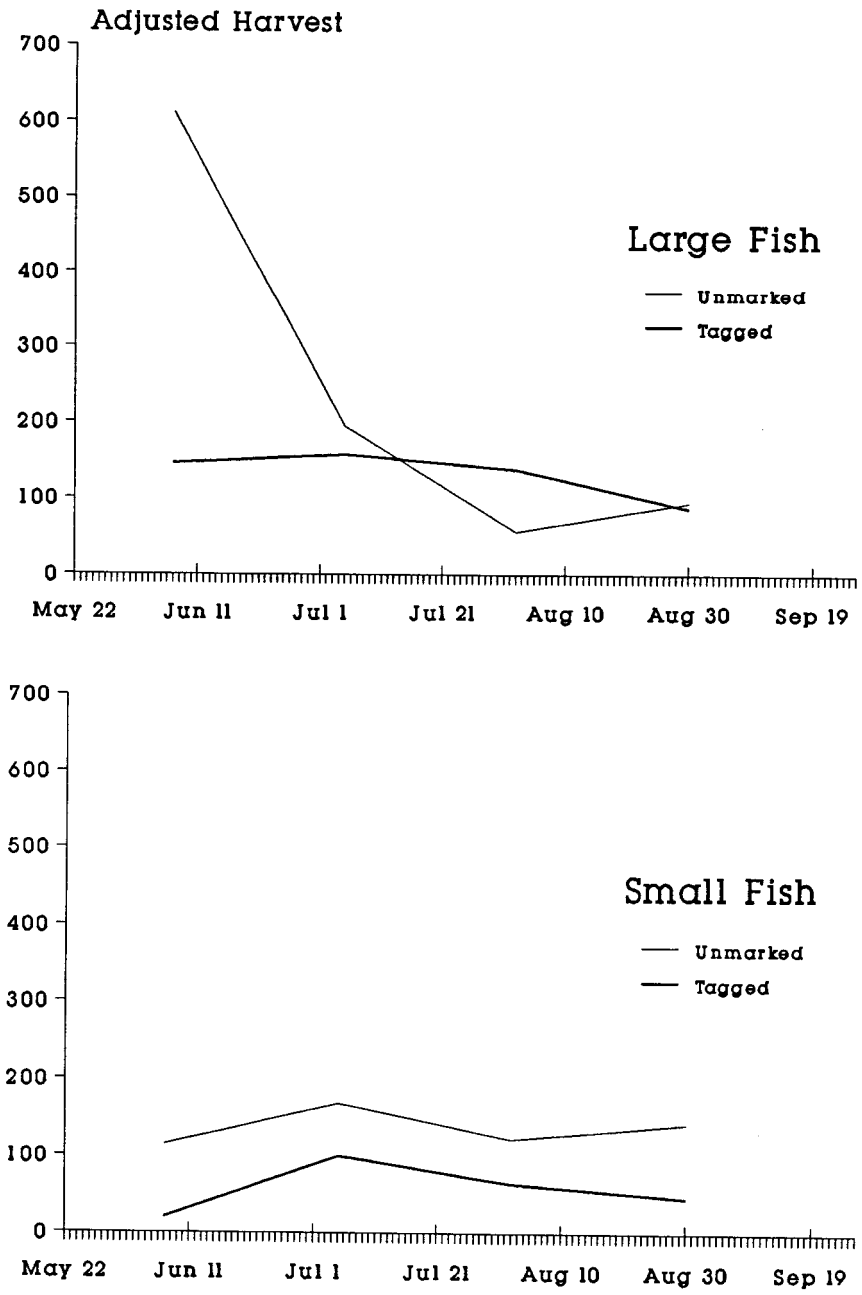

Figure 7. Harvest of tagged versus unmarked hatchery rainbow trout from upper Rock Creek in 1991 (adjusted for stocking).

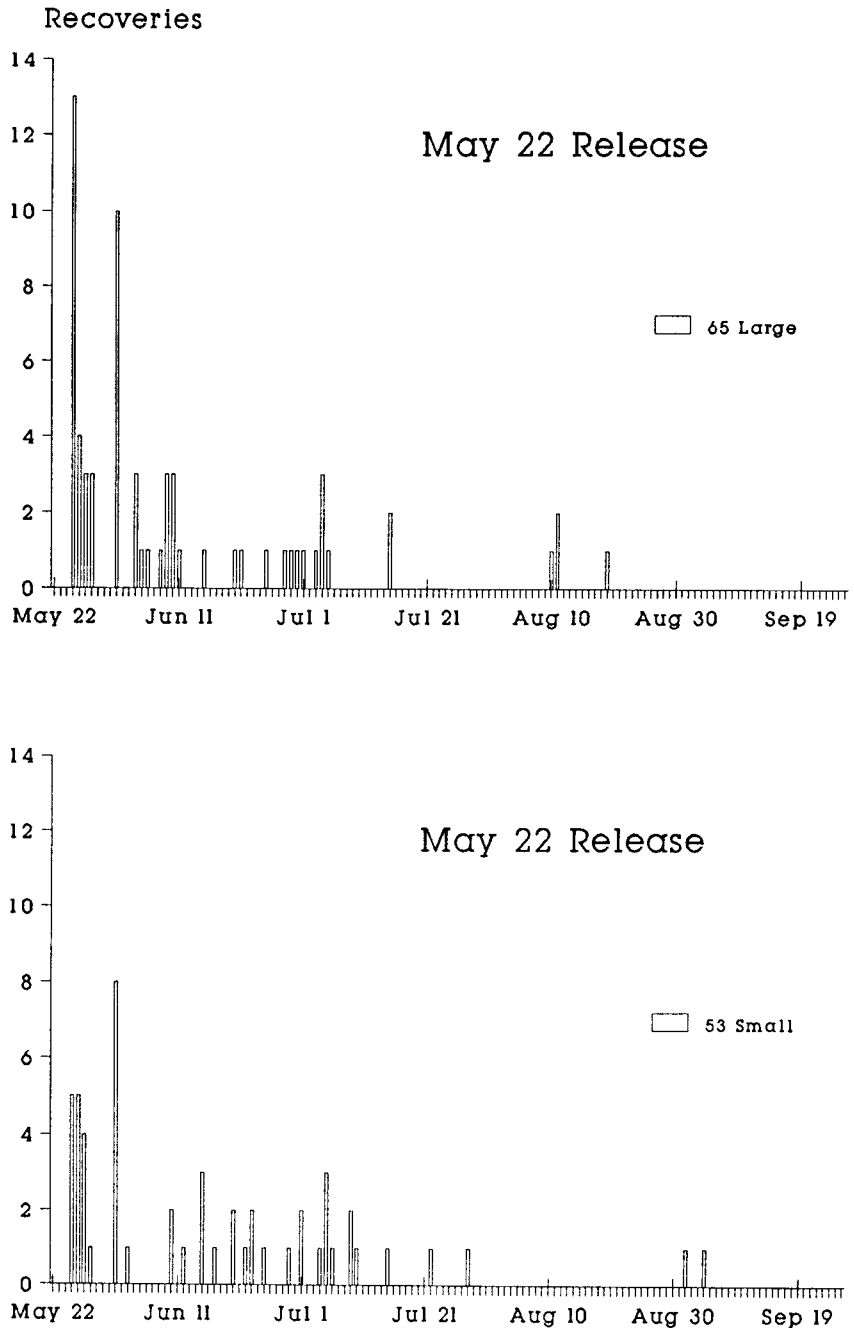

Figure 8. Timing of tag recoveries for large and small hatchery rainbow trout stocked in upper Rock Creek in May, 1991.

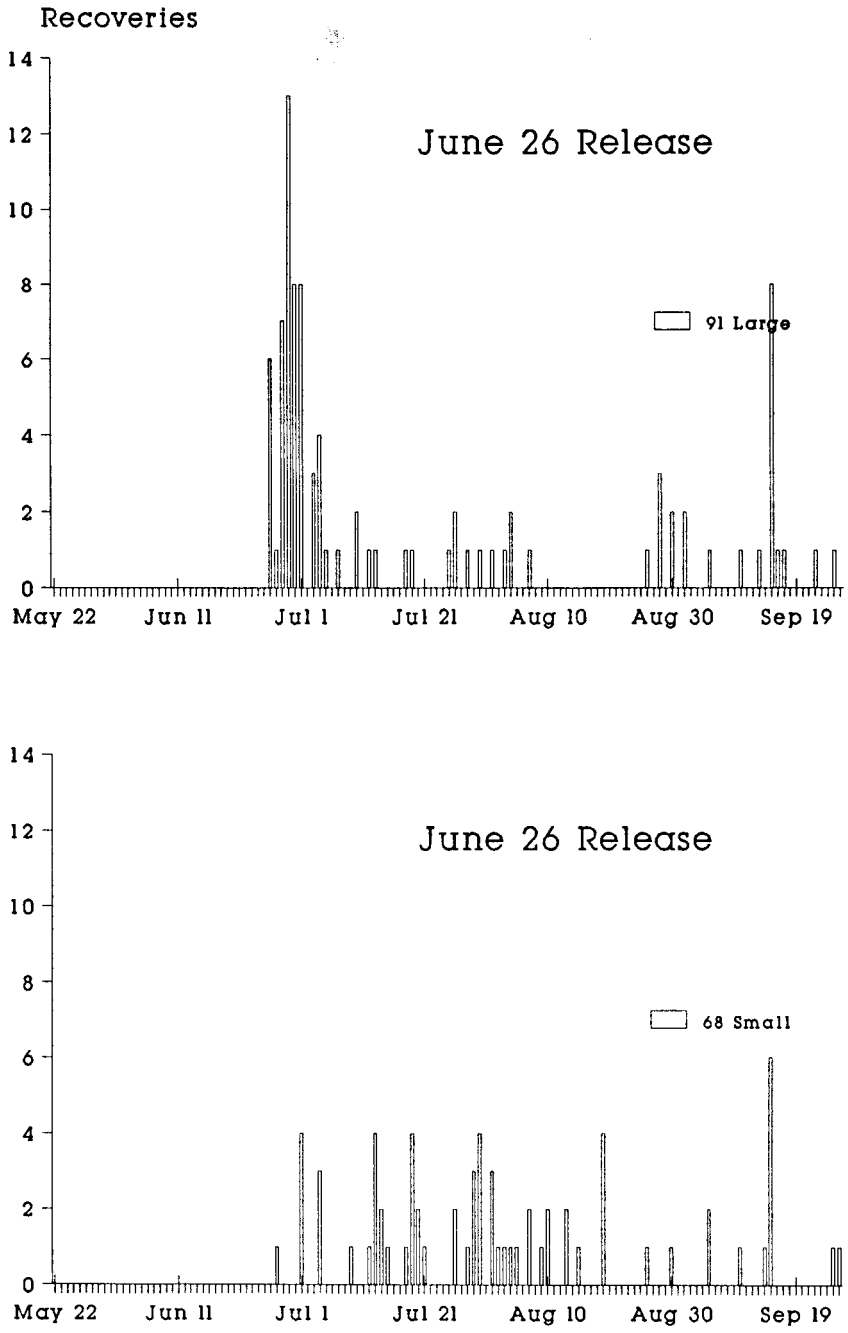

Figure 9. Timing of tag recoveries for large and small hatchery rainbow trout stocked in upper Rock Creek in June, 1991.

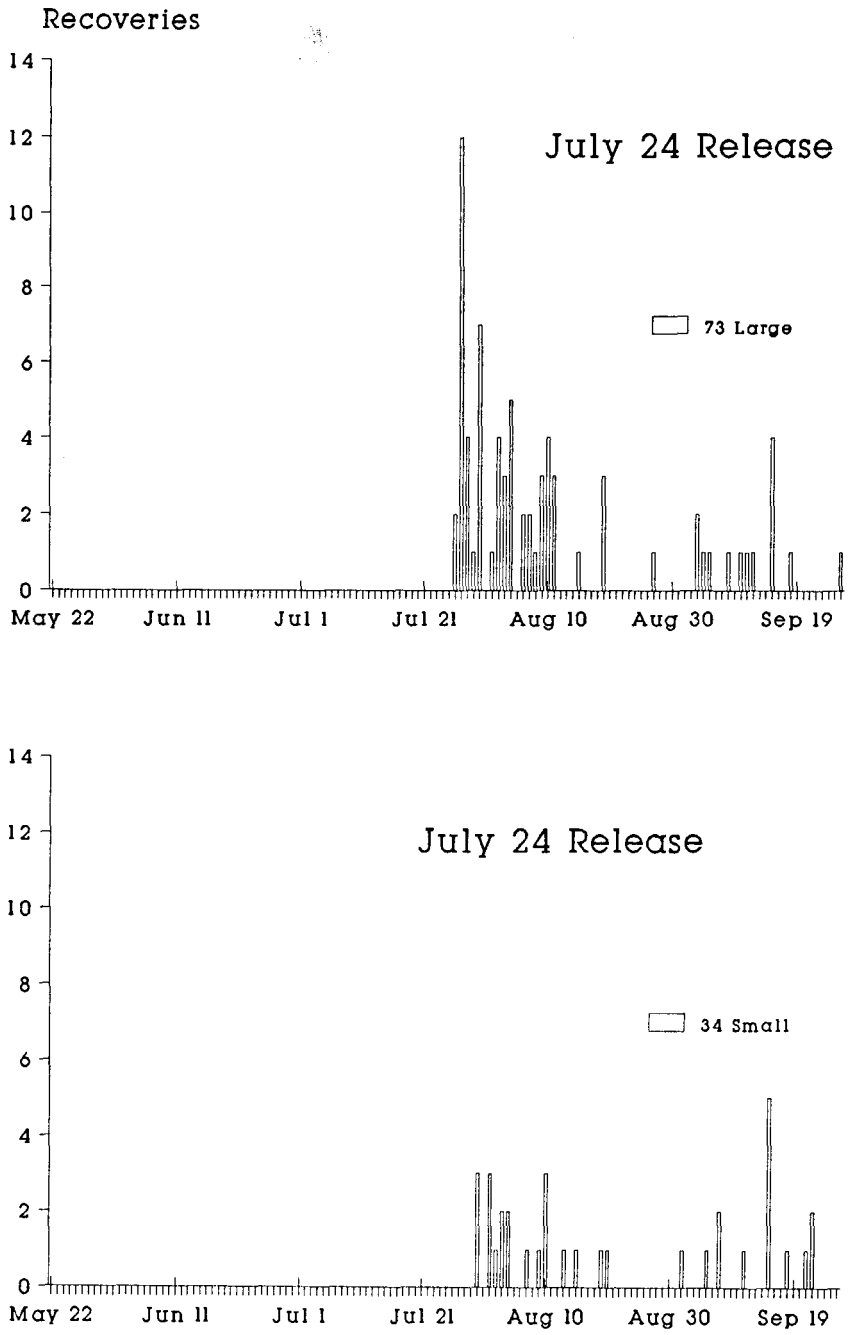

Figure 10. Timing of tag recoveries for large and small hatchery rainbow trout stocked in upper Rock Creek in July, 1991.

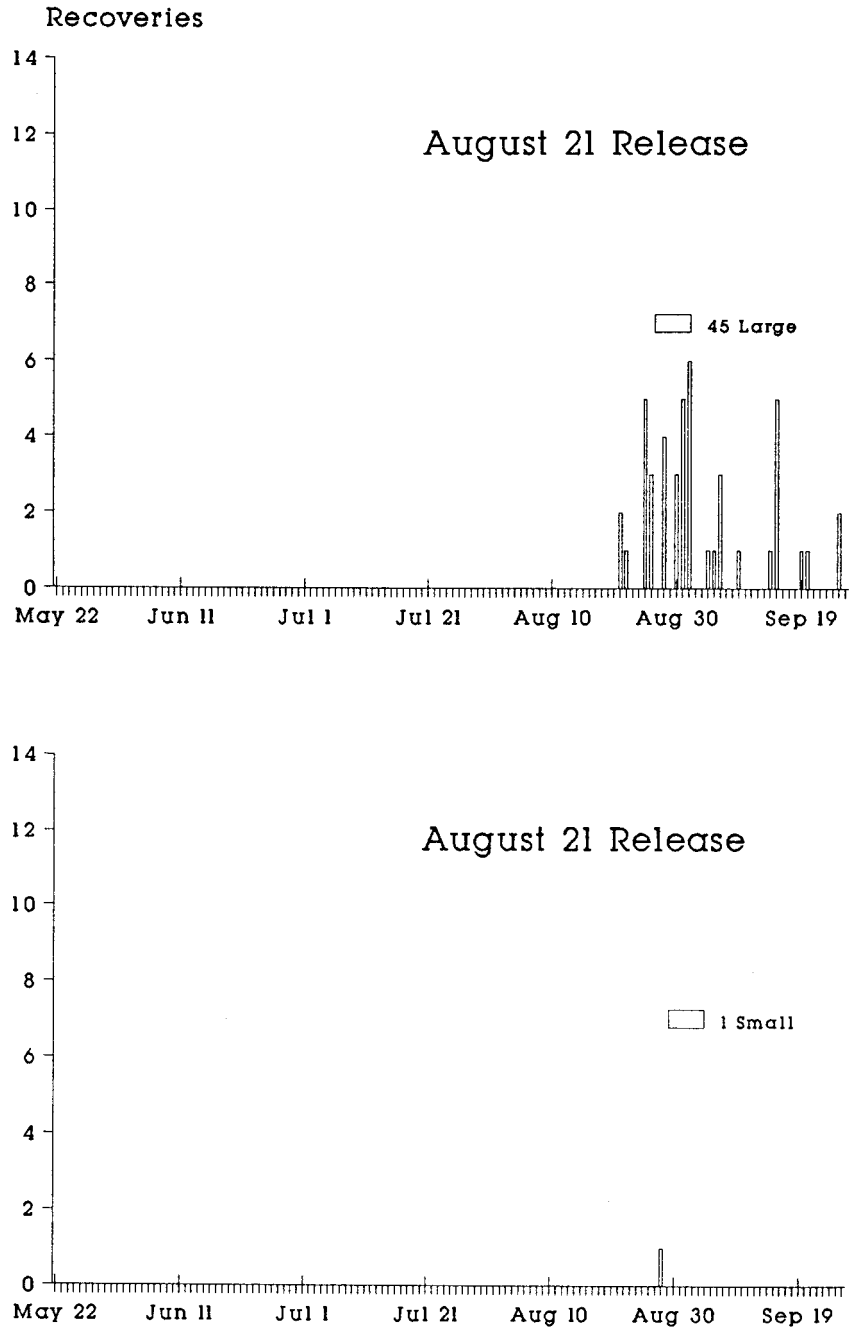

Figure 11. Timing of tag recoveries for large and small hatchery rainbow trout stocked in upper Rock Creek in August, 1991.

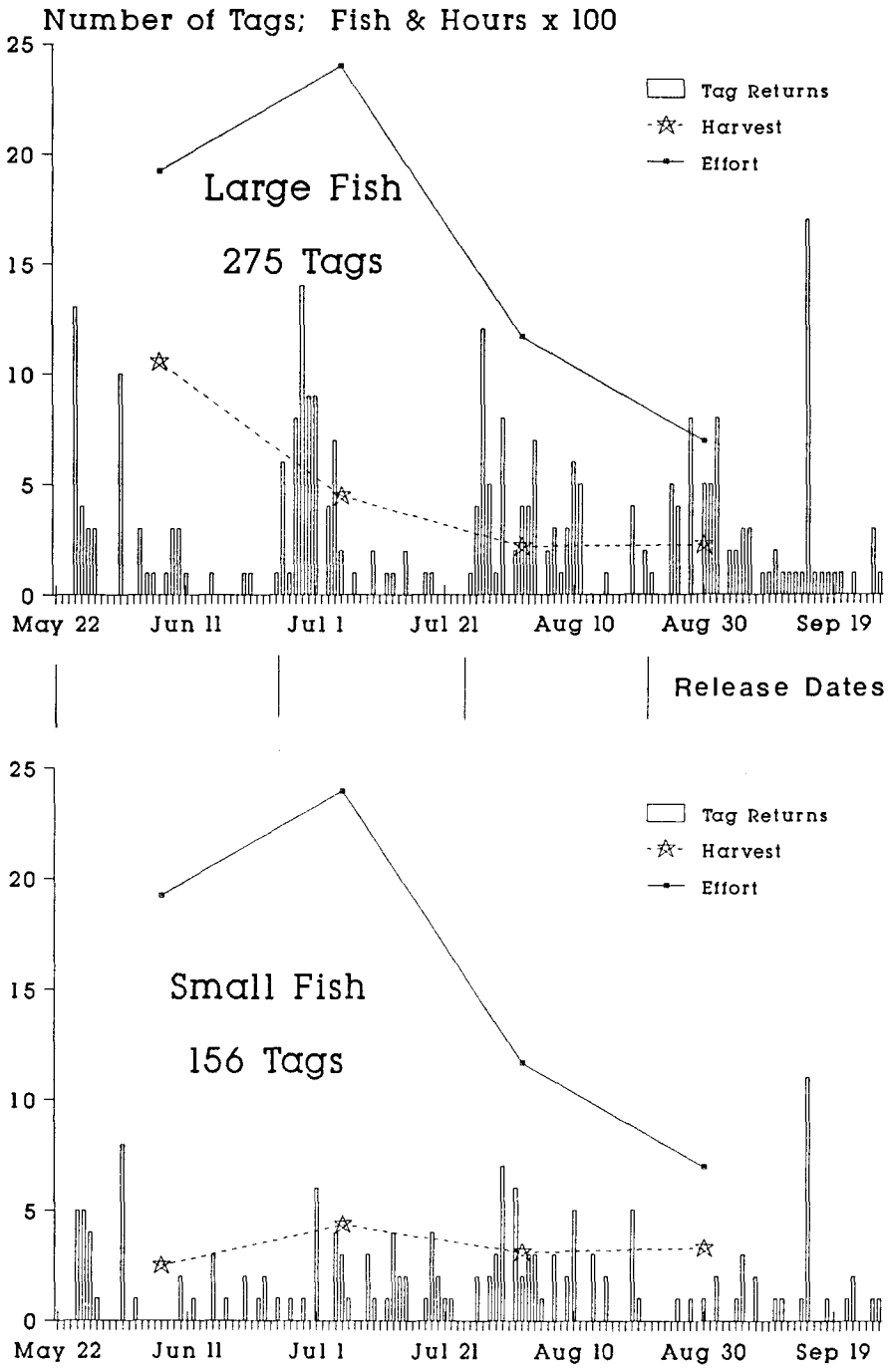

Figure 12. Timing of angler effort, harvest and tag returns for large and small hatchery rainbow trout from Rock Creek in 1991.

Table 6. Hatchery rainbow trout harvest and angler effort for the upper Salmon River near Stanley, Idaho in 1991.

	Census Section				
	1	2	3	4	Total
Harvest	1,620	3,701	10,998	1,123	17,442
Stocked	8,020	10,120	23,320	5,000	46,460
Effort(h)	6,302	5,211	16,461	3,875	31,849
H/km	788	620	831	305	651
H/hectare	318	175	182	67	161
No. Stocked/h effort	1.27	1.94	1.42	1.29	1.46
Return (%)	20	37	47	22	38
Fish/h	0.37	0.76	0.53	0.34	0.50

in Section 3, from Valley Creek to Yankee Fork, where number stocked per angler-hour was 1.4.

Harvest of hatchery rainbow trout increased during the summer. Other species had variable or declining harvest levels (Figure 13).

DISCUSSION

Stocking Relations

Relationships based on historical data may be useful to develop stocking guidelines. For example, stocking rates of about 280 fish/km at effort levels around 224 h/km could approach put-and-take fisheries return rates of 40% in streams (Figure 14). This would be an effort-related stocking rate of about 1.25 fish/angler hour and should produce a harvest catch rate of about 0.4 fish/h. Additional work needs to be done to verify relationships. The data are prone to autocorrelation, because most variables are derived from angler counts and success rates (Jackson et al. 1990). Multiple regression and data transformations will be used to develop statistically valid stocking relations (Rempel and Colby 1991).

Tools for Increasing Returns

Rock Creek

Census returns of 50% met existing guidelines for put-and-take programs. However, without larger fish stocked in 1991, returns would have been under 40%. Large fish probably improved catch rates and attracted additional angling effort. Though we did not ask anglers to rate their experience or assign values to fish of different sizes, unsolicited responses were indicative of high satisfaction with fish size and the Rock Creek fishery in 1991. Census clerks noted anglers released smaller rainbow trout when large fish were readily available.

Tagged fish apparently exhibited lower survival or catchability than untagged rainbow trout. Cooper (1952) found jaw tag returns lower than those of fin-clipped fish, especially the first week following stocking. Additional handling with no recovery time prior to stocking may also have reduced returns of tagged fish in Rock Creek. Variable survival or catchability of tagged trout may seriously bias estimates based on tagging information (Burnham et al. 1987).

Results indicate benefits to increasing the size of fish stocked. Assuming equal production costs of $0.94/lb, each small rainbow trout harvested in 1991 cost $0.54, each large fish $1.66 or three times as much. Large fish were 1.7 times as advantageous by weight return. Harvested small fish cost $2.55/lb compared to $1.50/lb for large fish.

Salmon River

In 1984, hatchery rainbow trout comprised 19% of total harvest May 26-September 15 from Alturas Creek to Sunbeam Dam (Partridge 1986). Return-to-creel was 59% of the 22,258 fish stocked. Estimated angling effort was 58,842 hours (Figure 15).

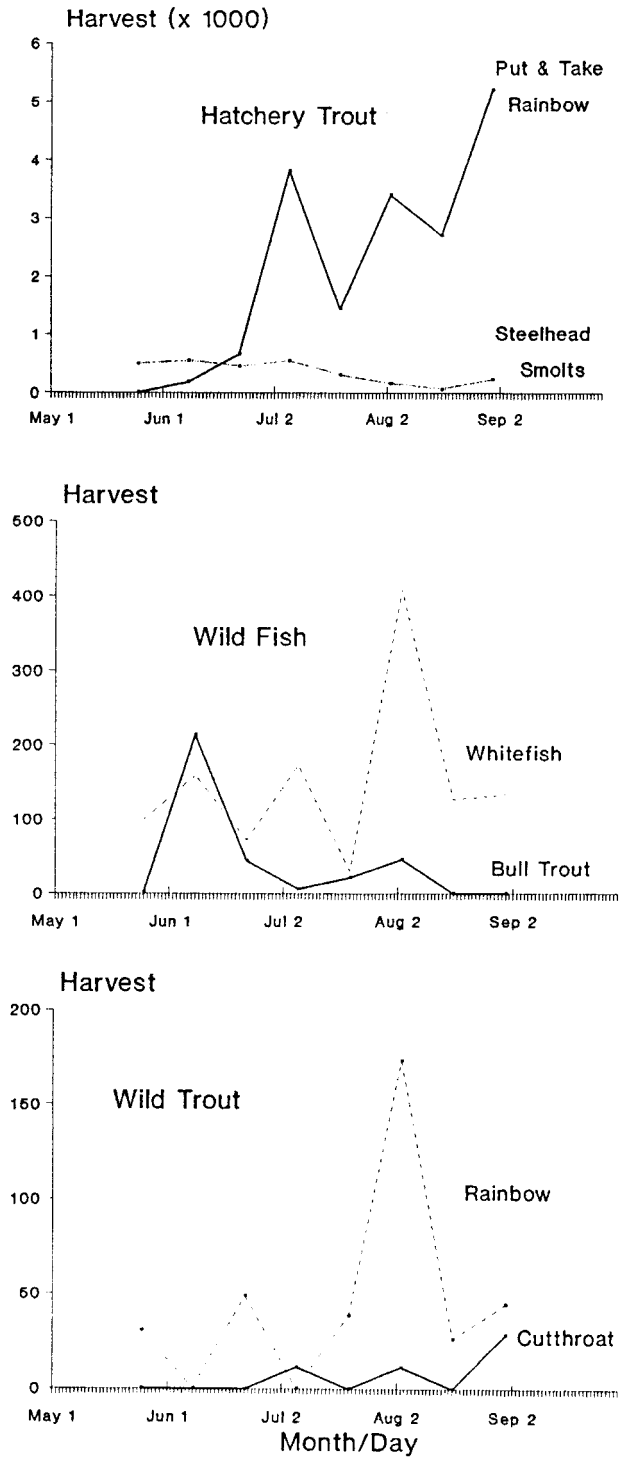

Figure 13. Timing of the harvest of major gamefish from the upper Salmon River in 1991 (estimated harvests at the beginning date for census intervals 1-8).

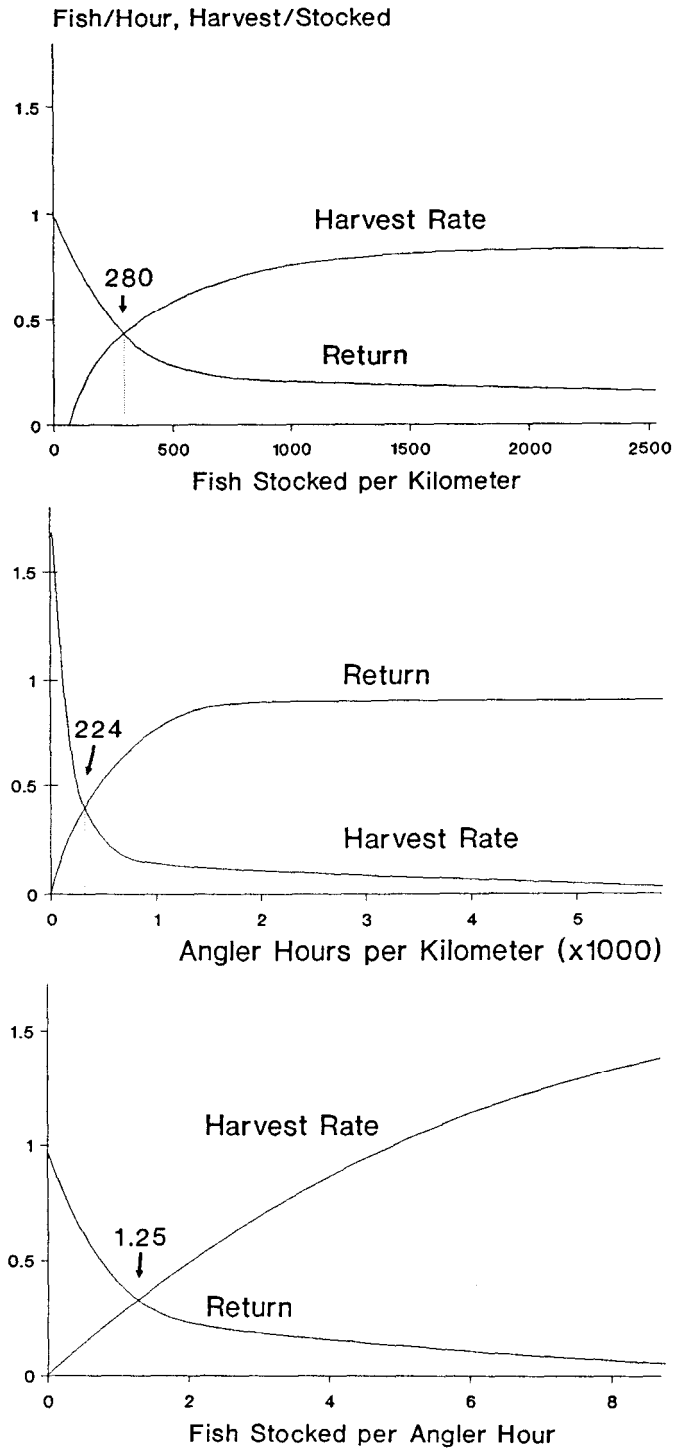

Figure 14 Stocking and effort levels suggested by relation for put-and-take rainbow trout in Idaho streams (lines fitted by inspection).

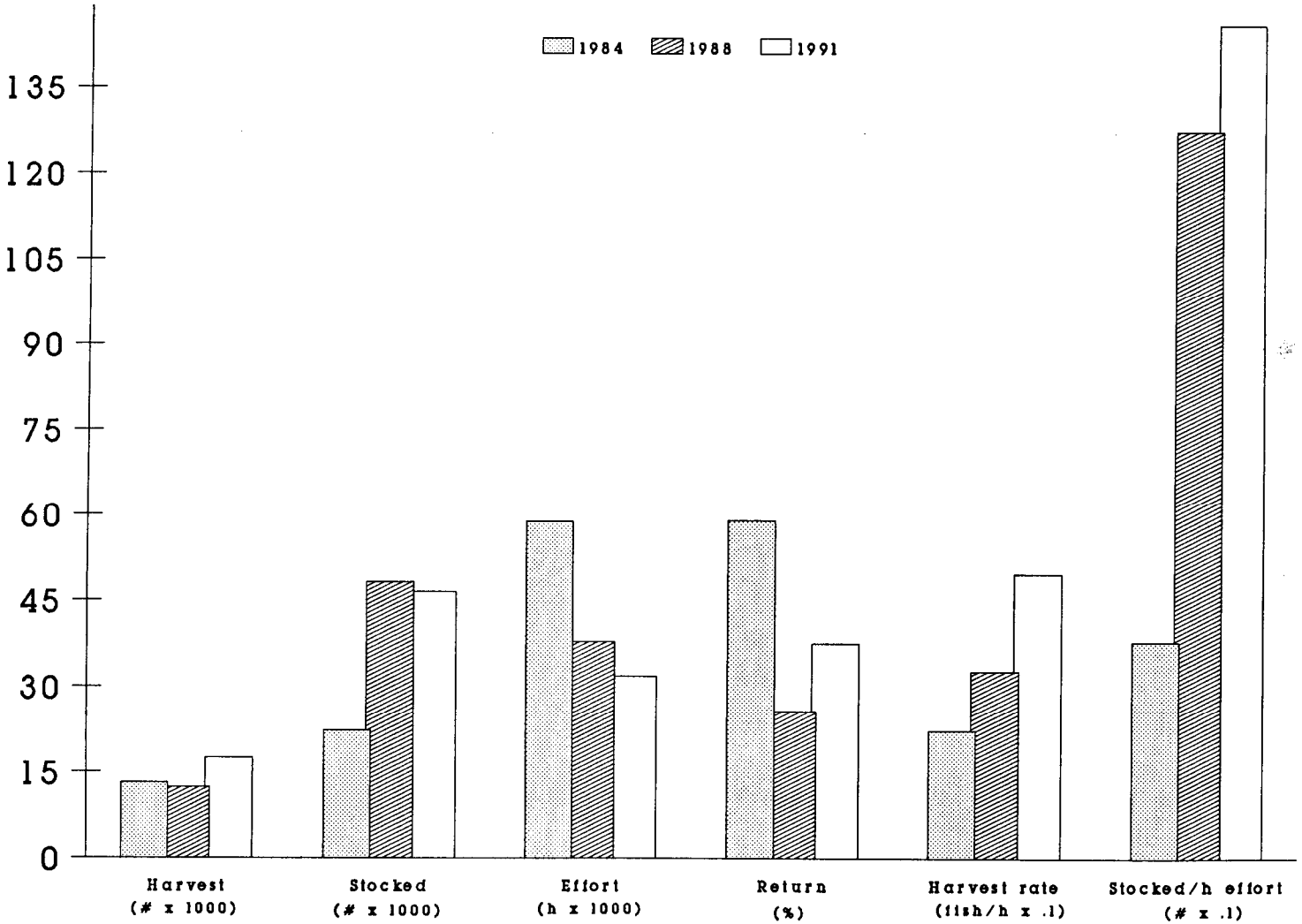

Figure 15. Comparison of upper Salmon River fishery in 1984, 1988, and 1991.

Lukens and Davis (1989) reported a 25% census return for hatchery rainbow trout from Hell Roaring Creek to Torrey's boat launch in 1988. A total of 48,803 hatchery rainbow trout were stocked. Effort was 37,816 hours.

The relatively low ratio of fish stocked to effort expended may account for the high rate of return and lower catch rate in 1984 compared to subsequent years (Figure 15). Increased stocking frequency may have been a factor contributing to better return-to-creel in the upper Salmon River fishery in 1991 compared to 1988.

Without a stocking program for rainbow trout of catchable size in the upper Salmon River, fishing success and effort would probably decline dramatically after early summer due to low harvest levels for other trout and char.

RECOMMENDATIONS

1. Stock 10 inch or larger trout in put-and-take waters to maximize vulnerability to angling and return-to-creel.

2. Add 14-18 inch fish to areas where better angler satisfaction is desired.

3. Due to size-related and other problems with marking, survival and reporting, marked fish should only be used to compare paired releases unless biases are measurable.

4. Stock put-and-take stream fisheries at interim rates of approximately 280 fish per kilometer or 1.25 fish per angler hour to achieve the 40% return to the creel criteria.

ACKNOWLEDGEMENTS

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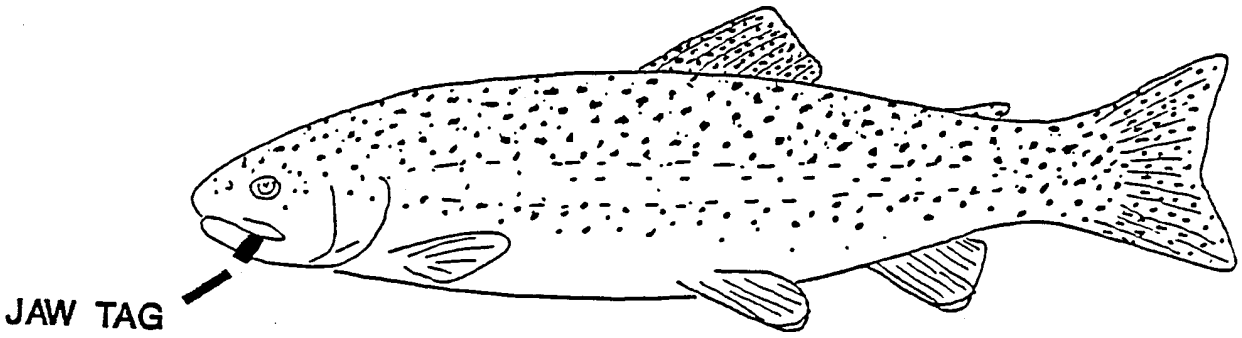
APPENDICES

Appendix 1. Poster used to request tag returns from Rock Creek in 1991.

-- ANGLERS --

- CATCHABLE TROUT STUDY -



A portion of the trout in these waters have been tagged. These fish are tagged to identify different groups of stocked fish and to evaluate their harvest by anglers. You can help us identify waters where the catchable program works best and needs to be continued by returning tags from fish you keep. Tags should be returned to:

IDAHO DEPARTMENT OF FISH AND GAME
868 East Main St., Box 428
Jerome, Idaho 83338
Telephone: (208) 324-4350

Your cooperation is appreciated and you will recieve a "TROUT" cap for your tag.

Appendix 2. Rainbow trout stocking information for the upper Salmon River near Stanley, Idaho in 1991.

Census section	Date	Number stocked daily	Number stocked total
1	May 22	1,000	
	Jun 24	1,120	
	Jul 01	500	
	Jul 17	1,000	
	Aug 14	1,000	
	Aug 22	1,000	
	Aug 28	1,000	
	Sep 04	1,000	
	Sep 06	400	
Total	May 22 - Sep 6		8,020
2	Jun 24	1,120	
	Jul 01	1,000	
	Jul 11	1,000	
	Jul 17	1,000	
	Jul 24	1,000	
	Aug 06	1,000	
	Aug 14	1,000	
	Aug 22	1,000	
	Aug 29	1,000	
	Sep 04	1,000	
Total	June 24 - Sep 4		10,120
3	Jun 24	1,120	
	Jun 25	2,000	
	Jul 02	2,000	
	Jul 16	2,000	
	Jul 17	1,000	
	Jul 26	2,000	
	Jul 31	1,000	
	Aug 07	3,000	
	Aug 14	2,000	
	Aug 15	1,000	
	Aug 22	1,000	
	Aug 29	3,000	
	Sep 06	2,200	
Total	Jun 24 - Sep 6		23,320
4	Jun 28	500	
	Jul 11	500	
	Jul 31	1,000	
	Aug 22	500	
	Aug 29	500	
	Aug 30	1,000	
	Sep 05	1,000	
Total	Jun 28 - Sep 5		5,000
GRAND TOTAL	May 22 - Sep 6		46,460

Appendix 3. Estimated angler effort and harvest for upper Rock Creek in 1991.

			Harvest							
			Large HRB		Small HRB					
Interval	Catch	Effort(h)	Tagged	Unmarked	Tagged	Unmarked	WRB	BRK	BRN	Total
05/25 - 06/21	2,306	1,923	145	910	20	229	189	65	102	1,660
06/22 - 07/19	1,286	2,398	157	290	99	336	62	20	0	964
07/20 - 08/16	726	1,165	138	83	64	244	0	0	0	529
08/27 - 09/13	605	696	87	140	46	283	0	11	0	567
TOTAL	4,923	6,182	527	1,423	229	1,092	251	96	102	3,720
95% CI	1,262	878	276	528	137	332	177	137	79	897

Appendix 4. Angler interview data for upper Rock Creek in 1991.

Interval	Number of Anglers	Fish Caught	Hours Fished	Catch Rate	Harvest								
					Large HRB		Small HRB						
					Tagged	Unmarked	Tagged	Unmarked	WRB	BRK	BRN	Total	Rate
05/25 - 06/21	107	216	183.0	1.18	9	92	3	21	23	6	10	164	0.90
06/22 - 07/19	123	113	209.2	0.54	13	27	10	28	5	2	0	85	0.41
07/20 - 08/16	108	114	158.5	0.72	20	16	10	35	0	0	0	81	0.51
08/17 - 09/13	47	77	94.0	0.82	11	23	6	24	0	2	0	66	0.70
TOTAL	385	520	644.7	0.81	53	158	29	108	28	10	10	396	0.61

Appendix 5. Estimated angler effort and harvest for upper Salmon River in 1991.

Interval	Total Catch	Effort (hours)	Harvest							
			Hatchery Rainbow	Steelhead Smolts	Wild Rainbow	Bull Trout	Cutthroat Trout	Chinook Salmon	Mountain Whitefish	Total
05/25 - 06/07	3,474	1,691	0	484	30	2	0	0	99	615
06/08 - 06/21	2,968	1,624	185	537	0	214	0	0	159	1,095
06/22 - 07/05	2,300	3,494	666	441	49	44	0	0	72	1,272
07/06 - 07/19	6,309	5,440	3,823	547	0	6	11	11	173	4,571
07/20 - 08/02	3,777	4,348	1,442	310	38	21	0	0	30	1,841
08/03 - 08/16	8,281	7,766	3,404	158	173	46	11	0	408	4,200
08/17 - 08/30	5,553	3,405	2,708	54	26	0	0	0	127,	2,915
08/31 - 09/13	11,903	4,081	5,214	227	44	0	28	0	134	5,647
TOTALS	44,565	31,849	17,442	2,758	360	333	50	11	1,202	22,156
95%CL	7,183	3,431	3,670	943	299	177	63	28	735	4,204

Appendix 6. Angler interview data for upper Salmon River in 1991.

Interval	No. of Anglers	Fish Caught	Hours Fished	Catch Rate	Harvest								
					Hatchery Rainbow	Steelhead Smolts	Wild Rainbow	Bull Trout	Cutthroat Trout	Chinook Salmon	Mountain Whitefish	Total	Rate
05/25 - 06/07	68	246	135.0	1.82	0	58	2	1	0	0	6	67	0.50
06/08 - 06/21	34	83	39.0	2.13	8	23	0	5	0	0	2	38	0.97
06/22 - 07/05	157	171	249.4	0.69	52	29	3	3	0	0	5	92	0.37
07/06 - 07/19	119	140	201.6	0.69	56	14	0	1	1	1	4	77	0.38
07/20 - 08/02	93	160	131.5	1.22	65	21	1	1	0	0	1	89	0.68
08/03 - 08/16	119	441	252.1	1.75	166	14	5	4	1	0	5	195	0.77
08/17 - 08/30	103	269	141.0	1.91	133	3	2	0	0	0	7	145	1.03
08/31 - 09/13	144	369	121.9	3.03	151	10	2	0	1	0	1	165	1.35
TOTALS	837	1,879	1,271.5	1.48	631	172	15	15	3	1	31	868	0.68

Submitted by:

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